

**NATIONAL AERONAUTICS AND SPACE ADMINISTRATION**  
**WORKFORCE STRATEGY**

## INTRODUCTION

NASA recognizes that an effective workforce strategy is critical to mission success. If a workforce strategy is to be truly effective, it must stem from a process that is grounded in the “real world.” The NASA strategy is based on objectives that contribute to accomplishing the President’s Vision for Space Exploration (VSE) and carrying out national priorities of scientific discovery and aeronautics research, while also recognizing the Agency’s financial responsibilities and limitations.

This report is divided into broad sections, each of which addresses a major segment of NASA’s civil service workforce strategy. (Note that all information in this document excludes the NASA Office of the Inspector General (OIG).)

- ◆ Section 1 highlights critical issues the Agency now faces, identifies key principles underlying the strategy development, and describes the planning process that will be used to support the workforce strategy on an ongoing basis.
- ◆ Section 2 describes the mission and budget changes that are driving changes in NASA’s workforce.
- ◆ Section 3 identifies the specific competency gaps and surpluses anticipated within the civil service workforce between now and 2011 as a result of mission and budget changes.
- ◆ Section 4 addresses the strategies NASA is taking to respond to its most critical challenges.
- ◆ Section 5 outlines the Agency’s recruitment and retention approaches.
- ◆ Section 6 provides concluding remarks and a final summary of the key points of NASA’s workforce strategy.

The NASA Workforce Strategy is predicated on the Agency’s commitment to building a stronger, healthier NASA, one that fully utilizes the capabilities of its Centers and its current workforce. The Agency will supplement these initiatives by focused use of a wide array of human resources tools. The targeted use of these tools will stem from the identification of competency issues derived from a comprehensive Agency-wide workforce planning process. Together, these actions form a strategy that will contribute to mission success.

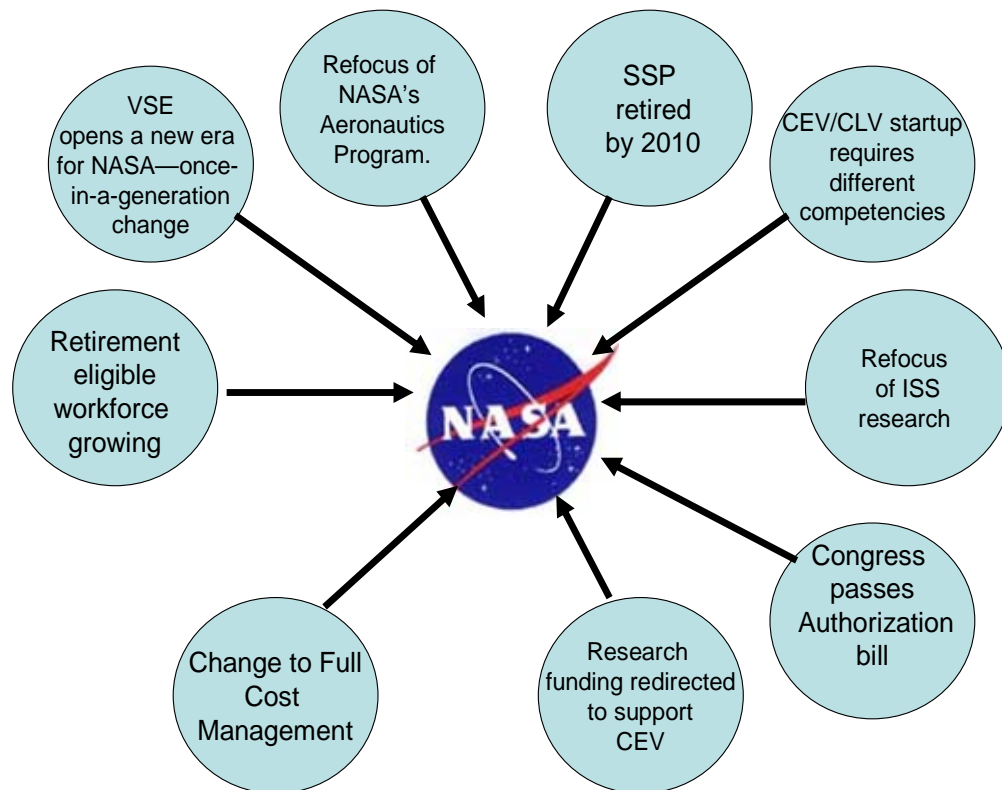
The strategy contained in this document reflects in-depth analysis of the best information available as of January 2006. Any significant changes in the information and assumptions will require reexamining the outcomes and making appropriate adjustments. Information and assumptions impacting workforce planning are likely to change as Exploration Systems Mission Directorate project plans and assignments relating to the development of the new Crew Exploration Vehicle (CEV) and Crew Launch Vehicle (CLV) become more defined. Additionally, changes in funding or earmarks, or the addition or termination of major programs, would also impact workforce planning. Planning can also be affected by external events such as unforeseen swings in the economy and/or labor market. Such changes have the potential to

affect the recruitment pool and/or the rates at which retirement-eligible employees leave the workforce. The ability to respond and adjust to such changes is a key goal of NASA's workforce planning approach for the 21<sup>st</sup> century.

## SECTION 1. OVERVIEW AND FOUNDATIONS

### SECTION 1A. A CRITICAL JUNCTURE

NASA is at a critical juncture in its history due to the confluence of a large number of major events, highlighted in the figure below:



(Note: The following acronyms are used in the above chart: SSP – Space Shuttle Program; CEV – Crew Exploration Vehicle; CLV – Crew Launch Vehicle; ISS – International Space Station; VSE – Vision for Space Exploration.)

Among the most significant of these issues are:

- ◆ *Implementation of the President's Vision for Space Exploration:* On January 14, 2004, President George W. Bush announced *A Renewed Spirit of Discovery: The President's Vision for U.S. Space Exploration*, a new directive for the Nation's space program. The fundamental goal of this directive is "to advance U.S. scientific, security, and economic interests through a robust space exploration program." With this action, the President committed the Nation to a journey of exploring the solar system and beyond, returning to the Moon in the next decade, then venturing further into the solar system, ultimately sending humans to Mars and beyond. He challenged NASA to establish new and innovative programs to enhance understanding of the planets, to ask new questions, and to answer

questions that are as old as humankind. The Congress endorsed this Vision for Space Exploration when both the U.S. Senate and the U.S. House of Representatives overwhelmingly adopted the NASA Authorization Act of 2005, which was signed into law on December 30, 2005.

- ◆ *Space Shuttle Retirement:* The year 2010 and the completion of the Space Shuttle Program (SSP) will mark the end of an era at NASA. The Space Shuttle is the Nation's only human-rated launch vehicle. It also is the only vehicle in the world with the launch and on-orbit capabilities needed to complete assembly of the International Space Station. Over the next five years, NASA will be executing a series of complex ISS assembly and servicing missions using the Space Shuttle while simultaneously developing a new Shuttle-derived replacement transportation system. NASA must find and implement effective ways to transition the Shuttle workforce while retaining the skills necessary to complete the program.
- ◆ *Refocus of the Aeronautics Program:* NASA is returning its focus to long-term, cutting-edge, fundamental research in traditional aeronautics disciplines, including aerodynamics, aeroacoustics, materials and structures, propulsion, dynamics and control, sensor and actuator technologies, advanced computational and mathematical techniques, and experimental measurement techniques. This comprehensive restructuring of the Agency's aeronautics research programs demands careful management of resources and capabilities to ensure the Agency meets its objectives within budget constraints.
- ◆ *Retirement-Eligible Workforce Growing:* Over the next five years, over 25 percent of the NASA workforce will become retirement eligible. While this does not necessarily mean a mass exodus of talent from the Agency, it creates a higher degree of uncertainty about the continuity of the long-term skill base. The Agency must identify ways to replace the skills it may lose, and it must tap into and share the knowledge and institutional memory of the Shuttle-era workforce with those who will be the "Vision Generation."
- ◆ *Development of CEV and CLV:* The design and development of a new crewed vehicle and launch system comes after a break of over 25 years since the last such activity. This activity catalyzes requirements for a different workforce skill mix. Reshaping the workforce must be done as soon as possible if the Agency is to meet the schedule established by the President and the Congress.
- ◆ *Change to Full Cost Management:* The transition to full cost management eliminated the account that funded salaries for the entire civil service workforce independent of the programs' need for their skills. As a result, funding for most of the civil service workforce comes directly or indirectly from the budgets of the programs (some remain part of the Center or Agency administrative overhead). As programs naturally progress through their normal life cycle, their civil service needs grow and then decline. This natural progression, as well as strategic shifts in the mix of Agency programs, creates challenges for the Centers in managing the mix of programs and the skills of the workforce to accomplish them.

These circumstances, in the aggregate, create extraordinary challenges for the Agency. NASA is moving to accomplish the goals of the President's Vision for Space Exploration, as difficult as any since the Apollo era, at a time when the budgetary and workforce issues require fresh and innovative approaches.

With great challenges, however, come great opportunities. Rather than merely focusing on managing the problems, NASA sees this critical juncture as an opportunity to restore and ensure NASA's core intellectual capabilities now and into the future. The Agency is determined to find ways to preserve and maintain the knowledge base of the current workforce, broaden and reinvigorate current skills, and acquire new ones as they are needed. In sum, NASA is determined to emerge from this period even better able to fulfill its role to the Nation.

## **SECTION 1B. KEY PRINCIPLES UNDERLYING THE WORKFORCE STRATEGY**

### **TEN HEALTHY CENTERS**

Successful accomplishment of the NASA mission requires ten fully engaged and productive Centers. NASA is committed to ensuring the vitality of these Centers, each with a clear mission, a role in making the Vision a reality, and sufficient funding and workload to sustain its workforce. This approach fully utilizes all of NASA's resources and vastly increases the Agency's ability to manage the normal ebb and flow of programs and projects in a comprehensive, reasoned, and cost-effective manner.

NASA has identified the following key attributes of a "strong and healthy" Center:

- ◆ Core, clear, stable, and enduring roles and responsibilities.
- ◆ Clear program/project management leadership roles.
- ◆ Major in-house durable space flight responsibility.
- ◆ Skilled and flexible blended workforce with sufficient depth and breadth.
- ◆ Technically competent and values-centered leadership.
- ◆ Capable and effectively utilized infrastructure.
- ◆ Strong stakeholder support.

The Agency has already made strides in delineating mission, direction, and high-level requirements that are an essential precursor to Center role definitions.

- ◆ In 2004, the Vision for Space Exploration was announced. The Vision establishes milestones and destinations that provide – at an Agency level – increased clarity for human space flight beyond low-Earth orbit.

- ◆ In 2005, NASA completed the Exploration Systems Architecture Study which outlined the top-level designs and architecture for the new systems and vehicles that will ultimately return the U.S. to the Moon and beyond.
- ◆ In January 2006, NASA announced plans for a comprehensive restructuring of its aeronautics research programs. This investment in core research capabilities will play an important role in ensuring that Centers with key aeronautics facilities (Ames Research Center, Glenn Research Center, and Langley Research Center) remain national assets with long-term missions that benefit the Nation.

#### **MAXIMIZE USE OF NASA’S CURRENT HUMAN CAPITAL CAPABILITIES**

One of NASA’s greatest strengths is the expertise of its employees – a team dedicated to the NASA mission and possessing the talent to meet the challenges presented by the Vision for Space Exploration. Throughout the reshaping process, NASA is committed to capitalizing on the potential of this workforce by using existing skills – expanding, rebalancing, and realigning them where necessary.

#### **EVOLVE TO A MORE FLEXIBLE, SCALABLE CIVIL SERVICE WORKFORCE**

NASA must have a more flexible workforce with sufficient “bench strength” to respond effectively to mission, programmatic, and budget changes as well as demographic and labor market fluctuations. As these changes occur, the Agency must be able to adjust quickly to address staffing needs or skill imbalances. This is difficult to achieve within the constraints of the rules and processes governing permanent civil service employment. For that reason, NASA must evolve to a more appropriate blend of permanent and nonpermanent civil servants.

### **SECTION 1C. WORKFORCE PLANNING – A NEW APPROACH**

The scope of mission, program, and workforce changes facing NASA requires changes in the Agency’s workforce planning approaches and processes. In the past, NASA’s workforce planning activities were predominantly Center-based, short-term, decentralized, and only loosely connected. Coordination and integration of workforce planning typically occurred on a relatively ad hoc basis in response to what was perceived as an anomalous workforce issue of an urgent nature.

NASA is implementing a workforce planning process that has different characteristics. All levels of management are involved (Agency, Mission Directorates, Program Managers, Center management), with each level soliciting substantive input and commentary throughout their respective organizations. Planning is coordinated and integrated among these elements, and workforce assessment and planning become integral components of NASA’s strategic, business, and resource planning activities. This approach will strengthen the capability of the Agency to assess the demand for and supply of workforce based on current and projected requirements.

NASA's approach and processes have several key elements:

- ◆ Guidance from and coordination among management at all levels of the Agency regarding the identification of each Center's core capabilities and its current and anticipated work demand.
- ◆ Coordinated assessment and planning effort at each Center to identify specific workforce requirements based on work demand and funding.
- ◆ Identification of workforce requirements for strong, healthy Center capabilities.
- ◆ Assessment of how to utilize both internal and external workforce to meet work requirements.
- ◆ Assessment of optimal internal workforce to meet work requirements and sustain a healthy Center.
- ◆ Identification of management actions necessary to achieve optimal near-term balance between demand and supply and long-term balance between potential demand and projected supply.

NASA's strengthened workforce planning capability will enable the Agency to improve its ability to identify areas of potential risk associated with matching workforce to work and, therefore, allow greater lead time in developing strategies to mitigate the risks.

The benefits of this new approach are exemplified in the Agency's recent initiative to identify work of a programmatic and project nature that can be assigned to Centers with uncovered capacity (addressed in more detail in section 4A.). This work transfer initiative is intended to address the short-term objective of mitigating a current workforce issue (uncovered capacity) and the long-term objective of sustaining ten strong, healthy Centers. This effort, guided by a cross-Agency team involving Agency management, Mission Directorates, and Centers, has the potential to make substantial improvements to the Agency's workforce and Center capability. The Agency-wide, integrated workforce planning approach will contribute strongly to the work transfer initiative.

The changes NASA is making to its approach clearly demonstrate that the Agency views workforce planning as a continuing responsibility to be managed and improved. Even the most effective process requires monitoring and adjustments based on unfolding events. Planning is a task requiring sensitivity to ongoing changes in programs, budgets, political priorities, and the labor market.



## SECTION 2. MISSION AND BUDGET IMPLICATIONS FOR THE WORKFORCE

The President's FY 2007 budget submission reflects an overall downward full-time equivalent (FTE) trend from now through FY 2011. These FTE projections are based on mission requirements and anticipated funding. They will require adjustment as more details are developed on the exploration systems work content and as the long-term research needs and goals of the restructured programs in aeronautics research are more clearly defined.

### NASA FTE TREND THROUGH FY 2011 (Excludes NASA OIG.)

	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
ARC	1380	1284	1193	1070	1070	1070	1070
DFRC	524	488	488	488	488	488	488
GRC	1821	1700	1562	1428	1428	1428	1428
GSFC	3303	3332	3223	3223	3223	3223	3223
JSC	3126	3237	3262	3262	3262	3172	2905
KSC	1981	2082	2107	2107	2107	2107	1902
LaRC	2130	1963	1839	1749	1749	1749	1749
MSFC	2668	2600	2600	2600	2600	2500	2400
SSC	294	284	284	284	284	284	284
HQ	1397	1390	1300	1300	1300	1300	1300
NSSC		50	121	146	157	159	159
Total	18624	18410	17979	17657	17668	17480	16908

(Note: The following acronyms are used in the above chart: OIG – Office of Inspector General; ARC – Ames Research Center; DFRC – Dryden Flight Research Center; GRC – Glenn Research Center; GSFC – Goddard Space Flight Center; JSC – Johnson Space Center; KSC – Kennedy Space Center; LaRC – Langley Research Center; MSFC – Marshall Space Flight Center; SSC – Stennis Space Center; HQ – NASA Headquarters; NSSC – NASA Shared Services Center.)

Changes in workyear requirements through FY 2010 are primarily driven by continuing redeployment of the workforce, especially to effect the restructuring of the aeronautics program and the development and testing of the Space Shuttle follow-on systems. Workyear requirements in FY 2011 reflect the end of the Shuttle program and transition to crewed flight systems that will require less labor on the ground.

In the period through FY 2011, the civil service workforce will need to adapt in multiple ways to support the Vision for Space Exploration and other NASA mission objectives. Civil service labor supports five principal work areas. There are four mission directorates, and each requires a portion of the overall workforce. A fifth component, mission support, serves all mission directorates by providing common business and administrative services, including finance, procurement, human resources, logistics, and information technology. Each of the five components is spread across multiple Centers, though they are not distributed equally among Centers. Each of the five components has unique characteristics and will be affected in different ways by changes in the coming years.

## EXPLORATION SYSTEMS AND SPACE OPERATIONS

The Vision for Space Exploration introduces major changes in the Exploration Systems and Space Operations Mission Directorates. Both directorates will change together in synergistic ways. The required core competencies for the Exploration Systems and Space Operations Mission Directorates have a high degree of overlap. The Vision for Space Exploration replaces major human space flight systems with new hardware, missions, operational requirements, and destinations. Capabilities to ensure safe Shuttle flight through completion must be maintained. Workforce requirements for civil service and contractors will change with the overlap/phasing for the Space Shuttle, the Space Station, and the development of the new CEV and CLV. NASA is committed to minimizing the gap between the end of Shuttle flights and the start of regular crewed flights of the CEV. As such, the timing of program workforce transitions from flight operations to development and back to operations will present challenges.

New hardware, software, and operations require new design, development, and testing. NASA has existing expertise in design, development, and testing of new systems. The new hardware, software, and operational systems have similarities to systems NASA has previously developed and operated. However, not all the personnel required for this design, development, and testing work have previous NASA experience in performing this work. While experience with a variety of robotic exploration programs has been continuous for the past 30 years, the experience of NASA's current workforce with crewed vehicles and launchers has been limited to the Shuttle and Station during that same time period.

Work requirements are affected by several major differences between systems and operations in the Shuttle era and those in the CEV era. In the CEV era, current generation technologies will be utilized, and more resources will be put into systems development. Fewer personnel will be required for operating and sustaining the hardware, especially during vehicle processing and launch operations. The Shuttle orbiter is intended for extended reuse and requires extensive refurbishing and preparation between flights. The CEV, if reused, requires less refurbishing. Both main propulsion components of the Shuttle are reused. Only the solid rocket booster, not the liquid fueled engines, will be reused with new launch vehicles. Reentry and landing systems are very different.

In the longer run, NASA will enter an era of frequent operations on the lunar surface. The surface operations will be complex, with a combination of people and robots conducting experiments at multiple sites. Being farther away will place new demands on communications, autonomy, and reliability. There is likely to be involvement of international surface teams, hardware, and Earth-based operators. These operations will be every bit as complex as the International Space Station. Building a flexible capability (workforce and infrastructure) will take years of effort.

## AERONAUTICS RESEARCH

The workforce requirements of the Aeronautics Research Mission Directorate will undergo moderate change as the restructured aeronautics program is implemented. NASA is returning to long-term investment in cutting-edge fundamental research in traditional aeronautics disciplines. It will invest in research for the long term in areas that are appropriate to NASA's unique capabilities and meeting its charter of addressing national needs, benefiting the public good, and

enhancing U.S. competitiveness. As the long-term research needs and goals of the restructured programs in aeronautics research are more clearly defined, some rebalancing of workforce capabilities will be needed. Requirements for human factors research and engineering, avionics, network systems and technology, and skilled mechanics and technicians will trend downward, while requirements for analytical and computational structural methods, structural dynamics, and thermal structures may trend upward.

### SCIENCE

The Science Mission Directorate workforce requirements will undergo moderate change. There will be evolution in the schedule and mix of programs and projects, but the work and competencies needed remain the same overall. The civil service scientific workforce consists of a large number of retirement-eligible employees, and there is a need to ensure the continuity of NASA's science capability through recruitment of new talent.

### MISSION SUPPORT

The workforce requirements for NASA's mission support component will undergo incremental changes. The mission support workforce will need to expand or shrink gradually as the Agency's technical workforce expands or shrinks. A major change in the way business services are delivered will be implemented between FY 2006 and FY 2008 with the establishment of the NASA Shared Services Center (NSSC) at the Stennis Space Center. The NSSC will take over transactional and other support functions on a phased basis, which will reduce Center staff in those functions.

## SECTION 3. AGENCY WORKFORCE COMPETENCY TRENDS

### SECTION 3A. BACKGROUND

NASA faces large-scale, unprecedented workforce issues as it focuses on the goals necessary to achieve the Vision for Space Exploration. The Agency must ensure that the workforce has the right mix of skills to develop new exploration vehicles and associated launch and support systems, retain a robust science portfolio, and reestablish an aeronautics program focused on cutting-edge fundamental research. At the same time, NASA must retain the skills needed to support the Space Shuttle and the International Space Station until program completion and then implement effective strategies to transition those employees to new work within NASA or to other endeavors.

In facing workforce issues of this magnitude, NASA has placed renewed emphasis on a critical element of strategic workforce planning: identifying the categories of employees for which the Agency anticipates an increased and/or diminished need and developing strategies to address those gaps and surpluses. The identification of these categories has been accomplished using two of NASA's workforce planning tools: the Workforce Integrated Management System (WIMS) and the Agency's Competency Management System (CMS). This information is essential to developing effective strategies to strengthen competencies in areas of increased need and reduce competencies in areas in which there is, or will be, a diminished need.

WIMS is a tool for collecting and managing the Agency's workforce and competency planning data. Through reporting, WIMS provides a single repository for Center and Agency workforce and competency planning data for use in Agency workforce planning decisions and analysis.

NASA's CMS is a collection of business processes and tools that are used to measure and monitor the Agency's corporate knowledge base. The term "competency," as used in CMS and in this document, is a conceptual representation of a body of knowledge. Competencies are used to categorize the capabilities of an employee, identify the knowledge requirements of a position or those associated with projects and programs, and forecast the Agency's workforce requirements.

An important concept in understanding the analysis of trends and projections contained in this section is the notion of *primary competency*. Typically, multiple competencies are associated with any individual position. The CMS identifies multiple competencies required for a position if they are utilized most of the time or represent critical knowledge areas for the position. For every position, one of the required competencies is designated as the "primary" competency; it is the one that best describes the knowledge that is utilized the most over a given fiscal year. The designation of a primary competency makes workforce forecasting and data analysis more manageable.

The workforce analysis in this section addresses trends and projections in terms of ranges in full-time equivalent (FTE) workyears of effort. In this context, the FTE number (or range of numbers) refers to the quantity of work (in workyears) for which the competency is designated as the *primary* competency. For example, a trend downward from 175 to 75 FTEs for

engineering and science support over a specified timeframe means that there are currently 175 workyears of effort for which that competency is primary, and by the designated timeframe, the Agency anticipates that there will be a need for 75 workyears of effort for which that competency is primary – a decrease of 100. It does not necessarily mean that the Agency will need 100 fewer employees at the end of that timeframe. A civil servant often works on multiple projects and tasks associated with multiple competencies.

The competency trends described in the following subsections reflect the Agency's best estimate as of mid-January 2006. They reflect shifts resulting from the need to support the key strategic goals essential to achieving the Vision for Space Exploration:

1. Fly the Shuttle as safely as possible until its retirement, not later than 2010.
2. Complete the International Space Station in a manner consistent with NASA's International Partner commitments and the needs of human exploration.
3. Develop a balanced overall program of science, exploration, and aeronautics consistent with the redirection of the human space flight program to focus on exploration.
4. Bring a new CEV into service no later than 2014 and possibly much sooner.
5. Encourage the pursuit of appropriate partnerships with the emerging commercial space sector.
6. Establish a lunar return program having the maximum possible utility for later missions to Mars and other destinations.

Further refinement and modification will be necessary as NASA completes plans for many exploration systems programs and projects, defines the nature of the work content for these programs and projects, and determines the roles the different Centers will have in this work. Additional changes in workforce projections are likely in the area of aeronautics as well, based on NASA's recent decision to return to long-term investment in cutting-edge fundamental research. The same uncertainty occurs in the science program, where the number of positions for any primary competency will depend on discoveries and consequent scientific priorities, the budget level, advances in technology, and the performance of individual science payloads. And finally, since some of the future work at Centers is unknown because it is based on the outcome of research competitions, precise estimates of future competency needs cannot be made until the competition is won.

Beyond redirections in programs, NASA's workforce needs are shaped also by the Agency's commitment to build ten strong and healthy Centers that are positioned, configured, and operated to support NASA's missions. Decisions about how the work will be done will be influenced by the need to ensure that all Centers have the attributes of a healthy Center, as described in section 1.

The current alignment of workforce competencies to mission needs is addressed below, followed by a summary of projected competency needs for the following two periods: FY 2006 through FY 2009 and FY 2010 through FY 2011. This approach is taken because program changes occurring in the 2010 timeframe (as the Shuttle program comes to an end and the International Space Station is completed) will significantly alter the competency needs of the Agency.

### **SECTION 3B. TODAY'S CHALLENGE— UNCOVERED CAPACITY**

At this time, NASA's workforce is not ideally aligned to the programs and projects that are being undertaken to support the Vision for Space Exploration. With the introduction of large programmatic changes associated with the Vision, NASA has approximately 1,000 uncovered FTEs throughout most of the five-year budget horizon. The term "uncovered" means that there is a quantity of available employee work time that is in excess of the quantity that programs require and for which they have agreed to pay.

The bulk of the current uncovered capacity has come about because of:

- ◆ Cancellation of the Space Launch Initiative.
- ◆ Redirection of funding for exploration research and technology development to the CEV.
- ◆ Reduction of funding for biological and physical research for the CEV.
- ◆ Reduction in funding for the aeronautics program.
- ◆ Restructuring of the science program and subsequent redirection of funds to higher priority missions in science.

As NASA projects and programs come and go, the demand for specific competencies needed to support those projects and programs will change accordingly. Normally, this is a low-level, predictable process that can be managed at the Center level, using the available workforce reshaping tools. In fact, with a civil service workforce of approximately 18,400, the proportion of uncovered employees in NASA is about 5 percent. However, the uncovered employees are not evenly distributed across the Agency; they are located primarily at Ames Research Center (ARC), Glenn Research Center (GRC), Langley Research Center (LaRC), and to a lesser extent Marshall Space Flight Center (MSFC) and Goddard Space Flight Center (GSFC). At ARC, GRC, and LaRC, the uncovered workforce represents 15 to 30 percent of the total civil service workforce at those Centers. The magnitude of the problem at these Centers requires Agency-level intervention and coordinated, aggressive action at all levels of the Agency to manage it.

The principal competencies associated with the current uncovered FTEs include the following: engineering and science support (technicians); workforce operations and support; program/project management; computer science and information technology, space sciences; business operations; various engineering of systems competencies; electrical and electronics systems; fundamental human factors research; and certain management competencies.

Identifying competencies associated with uncovered capacity is critical, but it is only the necessary first step in developing workforce solutions. Identifying the uncovered employees is more problematic. Individual civil service employees often work on several separate projects. When one of those projects goes away, only a portion of the employee's time becomes uncovered. The individual's remaining tasks will continue to be funded by the other projects. As a result, in a case where there are 300 unfunded FTEs at a Center, it would be a misnomer to state "there are 300 uncovered people." An example of a more accurate statement would be "there are 900 people that have 1/3 of their work hours uncovered." This is the normal situation, and it is not altogether obvious which individuals should be redeployed to solve the problem of uncovered capacity.

Uncovered capacity is not a one-time event. Anticipated in the future is another large workforce problem – the end of Shuttle operations and the ramp up of CEV development and testing. Recognizing that this is a problem to be managed, not eliminated, the Agency is committed to developing approaches to resolving the current problem that can be used in addressing future uncovered capacity as well.

### **SECTION 3C. FY 2006 THROUGH FY 2009**

#### **COMPETENCY TRENDS: INCREASED NEED THROUGH FY 2009**

Through FY 2009, NASA anticipates an increased need for the competencies identified below. For each competency, estimated ranges describe the projected increase in terms of FTEs representing positions for which the competency is designated as primary.

Program/project management: Increases in the range of 150 to 200 FTEs are anticipated in program/project management and related leadership competencies. Many of these increases result from the establishment of the new Constellation office, responsible for developing the CEV, CLV, and related exploration architecture systems. Expertise in program/project management will be critical to the Constellation program.

Systems engineering and integration engineering: An increased need for expertise in these areas of engineering is anticipated as the Agency focuses on CEV and CLV development (while continuing to support the Shuttle and Station Programs), with estimated FTE increases in the 100 to 150 range.

Mission operations competencies: Expertise in mission execution, mission assurance, and integrated logistics support will be critical, with an anticipated increased need in the range of 200 to 240. This competency is important to supporting the overall management and coordination of exploration systems development activities (development of spacecraft and ground systems, establishment of operations capability, and transition from the development to the operations phase); maintaining the Launch Services Program; and continuing to support the Shuttle and Station programs.

Systems analysis and mission planning: Expertise in this area will be important to exploration systems programs, with anticipated increased need in the range of 25 to 40. Several Centers have experienced recent unanticipated attrition in this area, particularly in the more specialized area of Aerospace Systems Concept Development and Technology Assessment.

Quality/safety/performance: The need for expertise in quality engineering and assurance, safety engineering and assurance, and software assurance engineering is expected to grow in the range of 50 to 75 FTEs. This competency is critical to ensure, establish, manage, and maintain the overall quality system for exploration systems hardware and software.

NASA anticipates an increased need, but on a more moderate level ranging from 10 to 50 FTEs, in the following technical areas:

Propulsion systems and testing; rocket propulsion.

Acoustics.

Habitability and environmental factors.

During this timeframe, the Agency also anticipates strengthening its expertise in certain critical, but nontechnical, competency areas:

Financial operations (including acquisition and contract management).

Business operations.

Professional administrative operations.

The projected increase in the number of positions in which these nontechnical competencies are primary will be in the range of 120 to 200 in each of these broad competency areas. A key factor relevant to these trends, particularly in the area of financial management expertise, is the increased emphasis being placed on strengthening financial planning and management within the Agency in support of the Vision for Space Exploration and other missions and regaining and sustaining an unqualified audit opinion on Agency financial statements.

#### COMPETENCY TRENDS: DIMINISHED NEED THROUGH FY 2009

Between now and through FY 2009, NASA anticipates a diminished need for the competencies identified below. For each competency, estimated ranges describe the reduction in terms of FTEs representing positions for which the competency is designated as primary. It should be noted that although the numbers representing a competency may decline when viewed as an Agencywide trend, a particular Center may have an increased need for that same competency due to program adjustments and/or workforce and labor-market trends specific to the Center.

Engineering and science support: Anticipated reductions of FTEs (i.e., in terms of positions for which this competency is primary) in the range of 200 to 250, with most reductions occurring in FY 2007 and FY 2008. These reductions reflect several trends, including an increased need for staff with professional engineering degrees and the fact that fabrication work previously done by in-house technicians is now available outside of NASA at better terms for the Government.



Management competencies: The Agency anticipates reductions of up to 450 FTEs at various levels of management in the competency areas of executive management, technical work and team management, and project work and team management. To a large extent, this reflects organizational changes designed to eliminate duplication of effort in offices, streamline management functions, and achieve flatter organizations.

Paraprofessional business operations: The need for this competency will diminish by almost 400 FTEs. In large part this reflects the phased implementation of the NSSC. This initiative consolidates various administrative and transactional business services in the areas of human resources, procurement, financial management, and information technology that are now being done at each Center. The consolidation of services, undertaken to improve overall quality and service and to more effectively leverage workforce skills and resources, will result in work currently done at Centers migrating to the NSSC. Accordingly, there will be a reduced need for these paraprofessional competencies at the Centers, but an increased need at the NSSC, although still less than that previously required at the Centers. Another factor affecting the trend in this area is recognition that the ratio of support staff to technical and professional staff at Headquarters can be reduced.

NASA anticipates a diminished need, but on a more moderate level in the range of 10 to 50 FTEs, in the following competency areas:

Facilities engineering and management.  
Space sciences.  
Biological sciences.  
Physical sciences.  
Program/project analysis.

Data systems and technology.  
Fundamental human factors research.  
Mathematical modeling and analysis.

### **SECTION 3D. FY 2010 THROUGH FY 2011**

In FY 2010 and FY 2011, Agency-wide reductions in terms of FTEs will continue as NASA moves toward its targeted FTE number of 16,908. Since the overall number of FTEs is declining, this will result in downward trends in many competencies in terms of the number of FTE positions for which a competency is primary.

Some of the competencies being reduced during this timeframe (i.e., the “surplus” competencies) are competencies that represented “gaps” in the FY 2006 to 2009 timeframe. NASA will be able to mitigate potential adverse impact, resulting from addressing the surplus competencies in the later years, by the nature of the strategies used to fill positions representing gaps in the earlier years. For example, if the gaps must be filled through external hiring in the earlier years, NASA will emphasize filling the positions on a term, rather than permanent, basis to avoid involuntary reductions of permanent employees later.

Competency areas in which a diminished need is projected across the Agency during the FY 2010 to FY 2011 timeframe are listed below. In many cases, the reductions reflect the changes that will occur as the Shuttle Program ends.

*Competency reductions in the range of 100 to 150 FTEs*

Engineering of systems (systems engineering, integration engineering, design and development engineering, test engineering).

Mission execution.

Program/project management, related leadership and management competencies.

Power and propulsion.

Workforce operations and support.

*Competency reductions in the range of 35 to 75 FTEs*

Mission operations.

Acquisition and contract management.

*Other reductions representing less than 30 FTEs*

Business management.

Software engineering.

Quality engineering and assurance.

Mission flight design.

Cryogenics engineering.

Network Systems and Technology.

Over the coming months as more details are developed on the exploration systems work content, quantitative projections of competency needs in the FY 2010 to 2011 timeframe will be developed. Information available at this time indicates potential increased need in these areas:

Extravehicular activity systems.

Environmental control and life support systems.

Habitability and environmental factors.

Intelligent/adaptive systems.

Robotics.

Electrical and electronic systems.

Advanced in-space propulsion.

Power systems.

Structures, materials, and mechanics.

The FTE ranges for projected competency increases and decreases do not directly reflect the FTE allocations in the table in section 2. There are several reasons for this. Changing competency requirements can be satisfied through a combination of internal reshaping initiatives (including retraining) along with hires and attrition. Additionally, the competency estimates in this section reflect only projected increases and decreases of 10 or more FTEs. As a result, the net of the projected competency increases and decreases through FY 2011 will not coincide with the FTE trend (in section 2) for that same period.

## SECTION 3E. CONCLUSION

NASA's workforce is facing change on a virtually unprecedented scale. Even with the best possible planning processes and workforce strategy, it is impossible to predict future requirements with certainty. In fact, to consider that the Agency has predicted them with certainty is perhaps the most dangerous assumption of all. As such, we will continue to utilize available flexibilities and pursue new ones, as necessary, to manage the workforce.

At the same time, NASA is moving forward aggressively to ensure everything possible has been done to prepare to accomplish the Vision for Space Exploration while continuing to pursue the Agency's missions of scientific discovery and aeronautics research. First and foremost, the Agency understands that all human capital planning efforts must be integrated across the Agency. The preceding information, and that which follows, acknowledges that those "on the ground" must provide critical facts and information about what is needed to get the mission accomplished. But it also recognizes that Agency leadership must ensure that this information is used in a manner that facilitates meaningful, effective, and fiscally responsible solutions.

The following section delineates NASA's strategy for managing the workforce needs demanded by the Vision for Space Exploration. It reflects commitment by NASA leadership to implement actions that draw on:

- ◆ An understanding of the workforce competencies required to execute the long-term vision of the Agency, the need for ongoing verification, and in-depth analysis of the dynamics of supply and demand.
- ◆ A comprehensive Agency approach to workforce planning to achieve a flexible, scalable workforce that will sustain recognized capabilities of NASA Centers.
- ◆ Strategic and human capital tools to manage the ongoing transition of the workforce.

Successfully implementing this strategy will help to ensure that we have the right skill mix to successfully execute the Vision for Space Exploration and maintain important work in NASA's aeronautics, space operations, and science portfolios.

## **SECTION 4. SOLVING OUR TWO MOST PRESSING WORKFORCE CHALLENGES**

### **SECTION 4A. MANAGING UNCOVERED CAPACITY AND EXCESS COMPETENCIES**

The technical nature of NASA's programs drives a continual cycle of reevaluating and adjusting competency requirements. This view is consistent with the Agency's philosophy that workforce planning is an ongoing process. An inevitable part of this process includes identification of competencies that are no longer needed or are no longer needed in the quantities previously required.

As the previous section indicates, there are competency areas in which NASA will reduce strength levels between now and 2011. Experience has shown that the least disruptive approach is to use multiple strategies to achieve reductions. Actions should be tailored to specific workforce circumstances, as well as to the personal situations of the employees involved.

Existing attrition management tools will continue to be used to encourage voluntary attrition where indicated. The most notable tools of this kind, buyouts and early outs, will be used, when authorized, to reduce surplus competencies. All buyout and early out programs will be targeted carefully to ensure that skills NASA needs are not eroded.

The Agency also will continue to devote resources to quality transition assistance services for employees contemplating transfers to the private sector or other Federal agencies. NASA has a contract in place to provide a robust set of transition assistance services to employees at all Centers.

The Agency will continue to facilitate reassignments of employees with surplus competencies to positions in which their skills are needed to mitigate the skills mismatch. As appropriate, incentives such as relocation bonuses or qualifications pay can be used to encourage voluntary transfers.

#### **AGENCY ACCOMPLISHMENTS TO DATE**

The Agency has already made significant use of a variety of strategic and human capital management options to address imbalances in workforce skills, particularly to reduce the level of "uncovered capacity," i.e., skills/resources in excess of the amount needed to accomplish the Agency's portfolio of programs. Over the past 18 months, the Agency has taken these actions:

- ◆ **Protection of Core Capabilities**

To recapture NASA's intellectual capital and to avoid furloughs and reductions in force, ARC, GRC, LaRC, and to a lesser extent GSFC have decided that they will not contract for work that is essential to strengthening and sustaining their core capabilities; instead, such work will be performed by their civil service workforce.

◆ *Establishment of shared assets account*

Through the Agency's corporately managed Shared Capability Asset Account, NASA will ensure that the Agency's unique high-value research, test, and evaluation capabilities remain available if they support missions that require them. NASA will identify and prioritize these critical assets and their associated human capital investments and make strategic investment decisions to replace, modify, or disposition them based on NASA and/or other national needs. NASA initially is implementing this account for four special classes of assets including wind tunnels, rocket propulsion testing, thermal vacuum test capability, and high-performance computing.

◆ *Buyouts and Early Retirements (incentive for voluntary attrition)*

Three early retirement/buyout programs conducted in the past two years resulted in approximately 950 employees retiring or resigning from the Agency.

◆ *Job fairs (moving people to the work)*

Job fairs conducted in FY 2005 resulted in 119 offers and 95 placements away from the Centers with uncovered capacity to Centers with hiring needs.

◆ *Hiring Controls*

In January 2005, NASA instituted a process for carefully managing the employment level through limitations on hiring from non-NASA sources. This provides more opportunity for emerging tasks to be assigned to the uncovered employees. In addition, the NASA Administrator has stated that work that cannot be accomplished by existing staff at the healthy Centers should be performed at Centers with uncovered capacity, unless otherwise waived based on analysis of risk or cost.

◆ *Work package transfers (moving work to the people)*

In late 2005, the Agency made its first attempts to identify work that could be transferred to Centers with uncovered capacity. This effort had some limited successes and paved the way for new efforts in 2006.

Collectively, these actions have reduced uncovered capacity by over half to the 1000 FTE level that exists today. Nevertheless, more remains to be done.

## CURRENT AND FUTURE EFFORTS

### **Work Package Transfers**

Current and future efforts will involve making effective use of the existing workforce by transferring work of a programmatic nature to Centers with the uncovered workforce. Senior management has directed a review of work transfer options with a presentation of viable recommendations before June 2006. A team has been established to review work packages, especially those addressing exploration-related work, that should be considered by Mission Directorates for transfer to Centers with uncovered capacity – principally ARC, GRC, and LaRC.

This work package transfer approach will not only mitigate the existing uncovered situation, but will contribute to the objective of having ten healthy Centers. The approach offers several advantages, including the following:

- ◆ It engages the whole Agency in space flight success.
- ◆ It requires no major disruptions of workforce.
- ◆ It rejuvenates space flight capability at the research Centers.
- ◆ It takes advantage of well-demonstrated synergies between aeronautics and exploration.

This approach also places renewed emphasis on building sufficient intellectual capacity for all Centers to do hands-on work in-house. Where necessary to facilitate the work transition, qualified employees may be temporarily reassigned to supplement shortfalls in program/project leadership at the gaining Centers. Rather than emphasizing relocation of employees from “hurting Centers” to strong Centers, an expensive process that siphons off talent and creates further imbalances in Center strengths, NASA will emphasize using the talent at each Center as a foundation for a stronger whole.

### **Retraining**

Although it is important to bring new talent into the Agency, NASA’s approach to strengthening competency needs also involves making maximum use of leveraging the talent already available in the current workforce. Retraining is an essential aspect of this effort. The Agency is reinvigorating its effort to retrain employees whose competencies are in areas of reduced need to perform work in areas in which there is an increased need. This commitment will require assessing individual employee competencies against specific workforce requirements and devoting funding to support retraining to meet these needs.

An investment in retraining is particularly well suited for the NASA workforce. Typically, most NASA engineers have worked on many projects throughout their careers and have developed a diversity of knowledge and skills. Retraining will allow them to renew those skills, increase their depth, or learn a closely related field. Simply stated, many of these individuals, in whom NASA has already made a significant investment, possess a strong foundation in the basic skills necessary to perform work in a variety of mission areas. With timely and aggressive retraining, these individuals can continue to be a vital part of the NASA team. Investment is relatively low risk, as most NASA employees are committed to an aerospace career and have a profound enthusiasm for NASA’s mission, as measured by Federal employee survey results and NASA’s low attrition rate.

A retraining program does require a commitment to continued funding of the affected employees, as well as an aggressive retraining investment, in order for employees to be productive as soon as possible. It also requires substantial “up-front” analytical and administrative work to ensure that the Agency is providing training for skills that will be needed

on a long-term basis; tools for equitable and efficient administration of the program are also required. Despite these demands, the Agency is committed to this approach as part of an investment in NASA's future.

Successful retraining enhances the ability of NASA to realign employees to work in areas where their skills are needed, supports new program-level work, and strengthens Center capacity. It provides the Agency with greater depth and bench strength. Such retraining capitalizes on the skills of employees who are in an excess-capacity situation by moving them to programs and projects where the Agency would otherwise have skill shortages. It would be overly optimistic to consider that this approach will resolve all of NASA's skill imbalance issues, but it is clearly an important first step.

### **Reimbursable Work**

The Agency also will seek to expand relevant reimbursable work. Relevant in this context means the work must be aligned with NASA's overall mission. A good example of aligned work is this: NASA has several facilities, especially in aeronautics, whose costs are covered in part or entirely by reimbursable work for other governmental agencies or industry. In addition, some NASA personnel are receiving funding from external sources through Space Act Agreements, competitive proposals to other agencies, and services rendered to other agencies. There is a belief that unneeded barriers exist and could be reduced and that such a reduction will enable an expansion of reimbursable work. There is also agreement that reimbursable work will not solve the uncovered capacity problem, but is one tool among many that can contribute to its solution.

### **Other Options**

Reductions in force (RIFs) remain an option (after March 16, 2007), but **this course of action is always a last resort**. Even apart from the adverse impact RIFs have on individual employees, they create turmoil and erode morale within the workforce, are costly to conduct, generate unwanted attrition among high-performing employees seeking a more stable work environment, adversely affect productivity, and inevitably create a new set of skills mismatches. In short, this course of action does not support NASA's commitment to building ten strong and healthy Centers and **will be used only when all other reshaping efforts fail**.

NASA also remains alert to the potential need for additional human capital flexibilities. This is a logical extension of the Agency philosophy that workforce management and planning are ongoing processes, not a series of discrete and unrelated events. As circumstances necessitate, and are supported by the requisite data, the Agency may undertake such initiatives.

Finally, a reduction in the amount of "off-the-top" funding required to meet Congressionally directed earmarks would offer a double-win to help meet the NASA mission. First, it allows sustenance of the planned program content; without additional funding to cover the earmarks, the Agency must cancel content from its planned programs. These cancellations further "uncover" existing workforce. Second, if the content is maintained, the new areas in that content offer opportunities for NASA's workforce. Said simply, to the extent that earmarked funds can be reduced, support for civil servants can be achieved. Today, the cost of the entire uncovered capacity is less than half the cost of the 2006 NASA earmarks.

## **SECTION 4B. SPACE SHUTTLE PROGRAM**

The Space Shuttle program presents unique challenges for NASA. The Agency must plan for the retention (and even hiring) of skills essential to safe mission execution while at the same time anticipating the need to shed or transition much of that workforce in an unusually tight window at program termination by 2010. The Agency is fully committed to making the last flight of the Shuttle safer than the first Return to Flight mission – and that goal demands that we have a capable workforce.

### **RETAINING NEEDED EMPLOYEES DURING PROGRAM LIFE**

The Space Shuttle program currently employs a workforce of approximately 2,000 civil service employees, who are a mixture of permanent and term hires. The Agency must find ways to motivate both term and permanent employees to remain with the program as long as they are needed.

The most obvious tool for accomplishing this is a retention incentive, which may be paid to any NASA employee when the unusually high or unique qualifications of the employee, or the special needs of the Agency for the employee's services, make it essential to retain the employee, and the employee would be likely to leave in the absence of the incentive. These incentives may be paid throughout the period during which an employee's skills are required and are accompanied by a service requirement. Generally, an employee may be paid up to 25 percent of pay times the number of years in the service period; under certain (rare) circumstances, up to 50 percent of pay, times the number of years of the service period, may be authorized, not to exceed 100 percent of salary. Payment can be in a lump sum or installments.

In addition, both term and permanent employees may be eligible for repayment of federally insured student loans. Payments can be made of up to a maximum of \$10,000 for an employee in a calendar year and a total of not more than \$60,000 for any one employee. An employee receiving such a repayment must sign a minimum three-year service agreement.

Under the NASA Flexibilities Act of 2004, term employees may be converted to permanent positions under authorized circumstances. The option for conversion to a permanent position has the potential to provide incentives for needed term employees to continue on the NASA rolls, if they might otherwise leave to accept permanent (or other nonpermanent) positions elsewhere.

### **COMMITMENT TO TRANSITION/FOLLOW-ON WORK**

At program completion, NASA will have completed its employment obligation to the non-permanent workforce. In addition, other Shuttle staff will be voluntarily retiring or moving on to other employment. Development, testing, and operation of the vehicles being built to replace the Shuttle will require most of the skills currently in the Shuttle workforce, although fewer people will be required to sustain operations. For those who remain with the Agency, NASA is committed to a transition strategy that uses current human capital capabilities where feasible.

Such a commitment has practical, positive implications for Shuttle program execution. Permanent employees are more likely to stay if they have confidence that the Agency will be able to use their skills in a post-Shuttle environment. To that end, and consistent with the



Agency's commitment to ten healthy Centers, NASA will look for continued opportunities to capitalize on the skills of the Shuttle workforce by transitioning them to the follow-on work.

Shuttle program employees will be identified for both reassignment opportunities and for participation in retraining programs. Retraining programs, as identified in Section 4A, provide a viable alternative for offering many valued employees an inducement to remain with the Agency, and in the Shuttle program, until closure.

## **SECTION 5. RECRUITMENT AND RETENTION METHODS**

To meet the Agency's special challenges and to successfully manage the workforce over the long term, NASA's workforce strategy involves using a variety of programmatic assignments, intercenter partnerships (through these assignments), recruitment, retention, retraining, reshaping, and attrition management tools and initiatives. The overall goal is to obtain the right breadth and depth of competencies appropriate to mission needs in a manner consistent with the principles of supporting ten healthy Centers, maximizing the use of the current workforce, and evolving to a more flexible and scalable civil service workforce.

This section describes the specific human capital approaches and initiatives for strengthening and sustaining competencies in the workforce.

### **SECTION 5A. STRENGTHENING COMPETENCIES - RECRUITING**

NASA has a long tradition of being proactive in using all available authorities, flexibilities, and programs to enable the Agency to recruit a world-class workforce. The Agency has made extensive use of targeted recruitment programs such as the Student Employment Program ("Co-op" Program), Federal Career Intern Program, and the Presidential Management Fellows Program (formerly the Presidential Management Intern Program) to recruit new technical and professional talent to the Agency.

The streamlined hiring authorities and special incentives obtained within the past two years through the Homeland Security Act of 2002, the NASA Flexibility Act of 2004, and the Federal Workforce Flexibility Act of 2004 also have been very helpful in the Agency's efforts to address recruitment and retention challenges.

NASA's education portfolio is committed to an investment to help strengthen the cadre of individuals with competencies essential for a world-class workforce to achieve NASA's mission. The Agency has a number of innovative education programs that use science, technology, engineering, and mathematics resources (content, people, and facilities) to inspire the next generation of explorers and innovators through the Vision for Space Exploration.

NASA delivers a comprehensive Agency education portfolio implemented by the Office of Education, the Mission Directorates, and the NASA Centers. Through the portfolio, NASA contributes to our Nation's efforts in achieving excellence in science, technology, engineering, and mathematics (STEM) education. These education investments contribute to the Agency's human capital needs. To achieve the Vision and ongoing science and aeronautics activities, the Agency requires a highly skilled and diverse workforce. Our education investments are an important component to ensuring the availability of that workforce. All of NASA's education efforts are part of an integrated Agency-wide approach to human capital management. Within the NASA Strategic Plan, Education is identified as a cross-cutting function that supports all of the Agency's strategic goals and objectives.

All NASA education programs are designed to:

- Fill the agencies workforce needs by linking program participation to NASA workforce requirements.
- Build a diverse pipeline of science and engineering talent to serve in the coming decades and continue America's preeminence in space and aeronautics research and development.

NASA's planned investments in education over the next decade will be strategically focused on three themes: Contribute to the development of the STEM workforce in disciplines needed to achieve NASA's strategic goals, through a portfolio of investments; attract and retain students in STEM disciplines through a progression (pipeline) of educational opportunities for students, teachers, and faculty; and build strategic partnerships and linkages between STEM formal and informal education providers that promote STEM literacy and awareness of NASA's mission.

NASA also uses financial incentives – including the new and enhanced incentives provided by the recent legislation – to compete successfully with other employers for top talent. These incentives include: recruitment, redesignation, and relocation bonuses; qualifications pay; superior qualifications appointments; student loan repayments; enhanced annual leave benefit; and travel and transportation reimbursement for new hires.

To compete successfully in today's market and appeal to the emerging workforce, NASA makes maximum use of technology-based processes. For example, several years ago, the Agency implemented an automated hiring system, NASA STARS, to simplify and expedite the hiring process. Much attention is devoted to designing and continually improving NASA's Web sites in a manner that will attract future talent to the Agency.

In addition to using recruitment tools, NASA recognizes that the retraining efforts described in detail in the previous section will also contribute to strengthening existing competencies by expanding the skill base of a workforce already committed to the NASA mission.

## **SECTION 5B. SUSTAINING COMPETENCIES – RETENTION METHODS**

NASA understands that mission success depends on the skills, talent, and dedication of its workforce. This is why the Agency has given careful consideration to the need to maintain and retain needed skills possessed by the existing workforce as part of its overall workforce strategy.

NASA's approach to retention also recognizes that, like recruitment, current competency gaps may become surpluses in succeeding years. Therefore, the Agency is prepared to address retention issues based on a long-term strategy for minimizing commitments and financial obligations beyond a time when the skills are needed.

Retention concerns are particularly important in a highly technical organization like NASA, where two-thirds of the employees are engaged in complex technical work, and more than one-third have a master's degree or higher. But the issue extends beyond a degree or position title.

The current NASA workforce provides continuity and specific program experience that cannot be easily replaced, particularly in a program like the Space Shuttle, where extended training periods are simply not feasible. Thus, the Agency has carefully assessed the level of need and the appropriate responses for diverging scenarios.

Retention is not currently a serious issue for NASA. The Agency's natural attrition rate has been 4 percent or less. There is, however, no guarantee that such rates will continue indefinitely – and neither do such rates ensure that the Agency retains those employees whose skills it most needs to keep. To that end, NASA is committed to identifying and developing mechanisms and approaches that maximize the Agency's ability to keep essential skills.

### A QUALITY WORKPLACE

In any circumstances, the most important retention factors in the NASA “toolbox” are the mission and the organization itself. Talented and high-performing individuals are attracted to organizations that provide challenging work in a creative professional environment offering opportunities for growth and development. The Vision for Space Exploration, which gives the Agency a new long-term vision and clear, bold objectives, is the archetypal creative professional opportunity.

### **Results of the “Best Places to Work” Report**

NASA is already strongly positioned within the Federal sector as an employer of choice. The “Best Places to Work in the Federal Government” analysis was published in December 2005. The report, sponsored by the Partnership for Public Service and the Institute for the Study of Public Policy Implementation, is an analysis of the 2004 Federal Human Capital Survey conducted by the Office of Personnel Management. It provides a comprehensive picture of employee satisfaction and engagement and compares many Federal outcomes to relevant private sector benchmarks.

The survey responses provide solid evidence of a workforce committed to the NASA mission. NASA, which ranked as the sixth most desirable Federal employer, received strongly positive responses in a number of significant areas:

- ◆ 73.1 percent - The percentage of respondents who described NASA as a good place to work, as compared to a Government-wide average of 60.9 percent. (Private sector benchmark is not available.)
- ◆ 73.3 percent - The percentage of respondents who expressed positive job satisfaction, as compared to a Government-wide average of 67.5 percent and a private sector benchmark of 71 percent.
- ◆ 79 percent - The percentage of respondents who said they were given an opportunity to improve their job skills, as compared to a Government-wide average of 63 percent and a private sector benchmark rate of 62 percent.

- ◆ 91.3 percent - The percentage of respondents who believe that the people in their workgroup “cooperate to get the job done.” This compares most favorably to a Government-wide average of 85.4 percent and a private sector benchmark of 77.3 percent.
- ◆ 88.2 percent - The percentage of respondents who believe their supervisor supports the need to balance work and family issues. This again compares very favorably to a Government-wide average of 79 percent and a private sector benchmark of 76.2 percent.

In sum, the responses clearly demonstrate an overall positive picture of NASA as a good place to work. Employees are engaged by their professional challenges, upbeat about an atmosphere of teamwork and collaboration, and generally able to balance the demands of career and home. Some of the NASA data shows declines in satisfaction levels. The Agency will be looking closely at the results of the next survey to identify any potentially disturbing trends and to identify appropriate steps to respond to problem areas.

NASA recognizes the importance of maintaining itself as a “good place to work.” The Agency continues to support human resources practices that foster such an environment. For example, NASA devotes significant attention to performance assessment and recognition, understanding that timely and appropriate management contributes to both employee satisfaction and to resolution of problems that might otherwise impede mission success and morale.

### **Retention Benefits of Ten Fully Engaged Centers**

As discussed in the first section of this document, NASA is committed to building and sustaining ten healthy Centers. This commitment will assuredly contribute strongly to mission success. The key attributes of healthy Centers play a direct and significant role in retention of needed skills, and in ways that go beyond simple and narrowly-focused “job security.” Consider the following:

- ◆ Stable and enduring mission roles allow employees the opportunity to engage in work in which they are truly interested and provide a continuity that allows employees to develop and expand their skills and expertise. It also sends a clear signal that, over time, there may be opportunities to progress within their fields of choice.
- ◆ Individuals who are engaged in work that directly supports NASA’s space flight responsibility are more likely to have a sense that they are making a genuine contribution to mission success. With a renewed emphasis on hands-on work in many areas (e.g., engineering) NASA employees will be important parts of the success story. In short, such individuals become a part of “what NASA is all about” and feel more affinity and commitment to remaining with the Agency.
- ◆ Values-centered leadership provides direction that is consistent with the expressed values of the Agency, including mutual respect for the entire workforce. A values-oriented leadership operating within an effective infrastructure has the ability to give employees confidence that their ideas and work will be judged on merit and that they can make their voices heard.

In sum, NASA believes that vigorous, goal-oriented Centers with clear and stable missions make a powerful contribution to enhancing employee loyalty and satisfaction and, thus, contribute to ensuring that NASA retains the skills it needs for the 21<sup>st</sup> century.

### CAREER DEVELOPMENT

NASA is strongly committed to a principle of life-long learning for its employees. More specifically, however, NASA recognizes that providing employees a clear vision of career development opportunities is a valuable tool in retaining needed skills. Individuals possessing such skills can more readily envision a long-term affiliation with the Agency as it recognizes their need for advancement. The strategy also meaningfully contributes to the development of those skills the Agency will need in the long term.

With this principle in mind, NASA has developed a Strategy for Leadership and Career Development. The strategy includes a framework that is intended to provide a consistent and integrated approach to leadership and management career development. Each leadership role within the framework contains components that are designed to enable employees to achieve and demonstrate the NASA values along with the identified competencies for that role. Common elements in each role include:

- ◆ Core experiences and broadening opportunities including mobility (as appropriate) – intellectual as well as geographical.
- ◆ Core and optional courses relevant to both achieving mastery in the role as well as preparing for the next step.
- ◆ Required role-specific courses on safety and diversity.
- ◆ Assessments – analysis of feedback from subordinates, supervisors, customers, peers, and stakeholders.
- ◆ Continuing education.
- ◆ Individual Development Plans.
- ◆ Coaching and mentoring.

The elements underpinning the strategy are currently under review, and the Agency anticipates moving forward with this strategy during the current fiscal year. Once adopted, the strategy provides a more consistent and integrated approach toward leadership and career development, as it will give NASA employees a framework within which they can plan their NASA careers.

### TARGETED RETENTION TOOLS

When addressing the need to retain skills on an ongoing basis, the Agency has options in addition to those already described in the preceding section, i.e., retention incentives, repayment of federally insured student loans, and the flexible term appointment authority. Some of these

options stem solely from the NASA Flexibilities Act of 2004, while others are grounded in broader Federal authorities.

These options include:

- ◆ Qualifications Pay (NASA authority) — NASA is authorized to provide a pay incentive to employees, in the form of setting the employees' pay at a higher step within the employees' grade, to encourage the employee to accept a new set of duties or a new position, based on their superior qualifications and/or a special need of the Agency.
- ◆ Relocation Incentives — A relocation incentive may be paid to a current Federal employee who must relocate to accept a position in a different geographic area that is likely to be difficult to fill in the absence of the incentive. The relocation may be temporary or permanent. There are two distinct relocation incentive authorities – the Federal-wide authority and the NASA-specific authority – but they are very similar. Generally, an employee may be paid up to 25 percent of pay, times the number of years in the service period; under certain (rare) circumstances, up to 50 percent of pay, times the number of years of the service period, may be authorized, not to exceed 100 percent of salary.
- ◆ Pay Authority for Critical Positions (NASA Authority) — The NASA Administrator is authorized to set the pay of an individual up to the level of the Vice President when necessary to recruit or retain an exceptionally well-qualified individual for a position that requires expertise of an extremely high level, and doing so is critical to successful accomplishment of an important mission. This authority is intended to be used only in truly exceptional cases and is therefore limited to ten employees at any given time.
- ◆ Intergovernmental Personnel Act Assignments: Intergovernmental Personnel Act (IPA) assignments offer employees with an interest in broadening their career knowledge an opportunity to do so, while at the same time providing an avenue for them to bring that knowledge back to NASA.

## **SECTION 5C. SUSTAINING COMPETENCIES – LOOKING BEYOND RETENTION**

Despite the value and importance of effective retention strategies, the Agency recognizes that loss of valued skills will inevitably occur. In some cases, attrition stems from forces beyond the Agency's control, such as a strong economy with high-paying jobs with which civil service salaries typically cannot compete.

More significantly, however, in looking at the demographics of the NASA workforce, it is clear that the Agency must plan for a time when substantial numbers of the workforce will retire. Such planning is not easy, in large part because retirement eligibility does not equal actual retirement. NASA currently has approximately 2,300 permanent full-time employees who are eligible for regular retirement; the average age of these individuals is 61.8 years. In fact, the data shows that engineers are now working an average of almost six years beyond their initial retirement eligibility dates, and scientists seven years. This is clear evidence that all who are

eligible to retire do not immediately do so. However long the Agency succeeds in retaining the most valued and necessary of these individuals, at some point, though, they are going to leave.

NASA is moving to address this issue in a number of ways by adopting approaches that provide for the retention of the knowledge possessed by an employee who chooses to leave NASA's full-time permanent workforce.

#### POSTRETIREMENT EMPLOYMENT

One approach is to offer postretirement employment to those possessing needed skills. Normally, the pay of a Federal retiree who is rehired into the Federal service is reduced by the amount of the employee's annuity. In circumstances in which there is exceptional difficulty recruiting a qualified employee, NASA may request approval from OPM to waive the salary reduction when appointing an annuitant who is uniquely qualified for the position or the only well-qualified person for the job. The waiver makes postretirement employment substantially more attractive and provides a means to retain these skills – and since annuitants are appointed on a temporary basis, it also provides maximum flexibility in managing skill levels as Agency needs fluctuate.

#### KNOWLEDGE MANAGEMENT

Perhaps more importantly, NASA is focusing on retaining the knowledge possessed by those whom we do not retain "in person." NASA's knowledge management efforts address this precise issue by helping to ensure that the knowledge and "corporate memory" are retained even after an individual leaves NASA's rolls.

NASA's approach to knowledge management is focused on sustaining a culture of learning by addressing the numerous human factors within an organization. Information is shared in a way that is both meaningful and useful to the workforce through a variety of tools and experiences. The Agency supports a breadth of activities, both on an Agency and Center level, which foster enduring learning opportunities for employees. In this environment, mission-critical knowledge is maintained among those employees who are responsible and accountable for achieving the Vision for Space Exploration.

Examples include the Chief Engineer's Office transfer of specific technical and organizational knowledge through its Masters Forum, ASK Magazine, and Academy of Program and Project Leadership learning programs. From this activity, program/project managers and engineers engage, share, and learn from fellow practitioners through stories and lessons learned. Most Centers have active mentoring programs. Additionally, the Office of Human Capital Management addresses the knowledge transfer needs of the Agency through the organization's leadership programs. These programs create environments to address the Agency's most current and strategic mission needs, promote OneNASA collaboration and teamwork, and provide tools and techniques to continue the learning experience at the Center level. NASA's leadership programs are benchmarked Government-wide as a proven process to develop future leaders, as well as share mission-critical knowledge across an organization.



NASA continues to make the dissemination of knowledge a critical element toward achieving mission success. The Agency supports the many knowledge transfer activities that occur daily throughout every organization and at each Center.

It is impossible to predict precisely the dimensions of the retention issues NASA will face through Fiscal Year 2011. There are simply too many variables involved. Nevertheless, the Agency has assessed and assembled an array of tools that may be used as the circumstances require.

## SECTION 6. SUMMARY AND FINAL CONCLUSIONS

As demonstrated by the preceding pages, NASA has developed, and is continuing to refine, a comprehensive workforce strategy. This strategy not only relies upon sound and effective human resource management tools, but also demonstrates the Agency's commitment to building a solid foundation from which to exercise those tools.

The workforce strategy allows NASA to deal effectively with the critical issues now facing the Agency, particularly a significant amount of uncovered capacity. NASA realizes that it is not sufficient to solve the immediate problem. Rather, the Agency's goal is to address these issues now on an integrated, Agency-wide basis, putting in place approaches that not only alleviate the Agency's current imbalances, but also provide a structure that allows such issues to be resolved in the future as part of a "normal process." NASA does recognize that some future events, such as the termination of the Space Shuttle Program, require long-term planning and Agency-level coordination – but the foundation being built today will greatly facilitate their resolution.

### SECTION 6A. AGENCY FOUNDATION

In summary, NASA intends to take the following steps and considers these to be essential to both mission accomplishment and effective management of its human capital.

- ◆ **Build and maintain ten strong and healthy Centers.** NASA views developing and maintaining ten strong and healthy Centers as fundamental to ensuring the core capabilities needed for mission success. This process includes realigning major program-level "work packages" among Centers. It also will contribute strongly to reducing current uncovered capacity to manageable levels and reduce the dimensions of the problem in the future. Finally, by emphasizing the performance of work integrally related to the principal NASA missions, it contributes to the retention of employees possessing needed skills.
- ◆ **Invigorate and emphasize retraining of the current workforce.** The Agency will target areas of skill needs, building and expanding on the skills already possessed by the current workforce. While NASA will use personnel transfers between Centers to eliminate some skill mismatches, the key focus will be on aggressive retraining within Centers, which helps to ensure an equitable balance of talent and work at all Centers and is an important factor in sustaining ten healthy Centers.
- ◆ **Fully develop and maintain a structured workforce planning process.** NASA recognizes that a coherent and comprehensive workforce planning process is essential not only to resolving today's issues, but also to ensuring that the Agency has the capacity to readily manage these issues in the future. The process NASA is developing will ensure that workforce planning is viewed as an Agency-wide, integrated function in which stakeholders at all levels actively participate.

## SECTION 6B. HUMAN RESOURCES TOOLS

The above actions reflect the measures the Agency is taking to fundamentally improve its ability to manage current uncovered capacity and to lay the groundwork for a more comprehensive approach in the future.

NASA also will capitalize on the full array of human resources tools and options to assist in managing workforce issues. By appropriately targeting these tools, the Agency retains the flexibility to use them when they are most appropriate, without locking in an approach that may later be inappropriate in a dynamic workforce environment. The most significant of these are summarized below.

- ◆ **Use term and temporary hiring authorities:** This is among the most important of the human resources strategies the Agency plans to use in addressing competency issues. NASA is committed to moving to a more flexible and scalable workforce as a means of responding to the evolving nature of workforce requirements. Nonpermanent appointments, especially term appointments, provide an excellent method of obtaining skills without the long-term commitments made to permanent employees. Particularly because of the additional flexibilities available to NASA, term appointments provide an attractive employment package for applicants, while still not burdening the Agency with the obligations of permanent employees. In addition, temporary appointments of retirees offer a means to retain capabilities in the skill base when they are needed for finite periods.
- ◆ **Maintain a high-quality workplace:** NASA recognizes that a key to effective recruitment and retention is ensuring that NASA is a place where people want to work. In addition to providing rewarding work, the Agency is committed to supporting human resources approaches that facilitate this goal – appropriate training opportunities (including leadership development), well-designed and responsive recognition systems, and other similar methods.
- ◆ **Apply recruitment flexibilities:** NASA has an excellent track record of using the full array of appropriate hiring authorities, including intern programs and the flexibilities provided by the Homeland Security Act of 2002, the NASA Flexibility Act of 2004, and the Federal Workforce Flexibility Act of 2004.
- ◆ **Offer financial incentives:** NASA plans to use financial incentives, including recruitment, retention, relocation, and redesignation bonuses, as inducements in hiring and retaining needed talent. Many of these incentives are structured to assist the Agency in achieving specific results.
- ◆ **Manage surplus employees:** While a RIF is always a tool of last resort, a number of other tools are available that avoid the disruption created by RIFs. The Agency may encourage voluntary attrition of targeted skills or functions through buyouts and early retirements and provide career transition services to support those who may move on to other alternatives.

- ◆ **Institute hiring controls:** This can be an effective tool, especially on a short-term basis, as it allows the Agency to focus on internal rebalancing of skills and ceiling management issues.
- ◆ **Foster knowledge management:** NASA understands that it is important to ensure that institutional knowledge and competencies are not lost when individuals depart and is engaged in building effective knowledge management tools to ensure that current employees have the opportunity to share their knowledge and to learn from others. This action contributes to a satisfying and productive work environment and supports the retention of core capabilities over time.

In sum, NASA is committed to ensuring that the Agency effectively maintains and uses the full array of available human resources tools. These tools, together with an invigorated institutional foundation, will provide NASA with a workforce strategy that will support accomplishment of the Vision for Space Exploration and beyond.

## ACRONYMS and ABBREVIATIONS

APPL	Academy of Program and Project Leadership
ARC	Ames Research Center
ARMD	Aeronautics Research Mission Directorate
CEV	Crew Exploration Vehicle
CLV	Crew Launch Vehicle
CMS	Competency Management System
DFRC	Dryden Flight Research Center
ESMD	Exploration Systems Mission Directorate
FTE	Full-time equivalent
GRC	Glenn Research Center
GSFC	Goddard Space Flight Center
ISS	International Space Station
LaRC	Langley Research Center
MSFC	Marshall Space Flight Center
NSSC	NASA Shared Services Center
OIG	Office of the Inspector General
RIF	Reduction in Force
SOMD	Space Operations Mission Directorate
SMD	Science Mission Directorate
SSC	Stennis Space Center
SSP	Space Shuttle Program
VSE	Vision for Space Exploration
WIMS	Workforce Integrated Management System